Periscope.

PHYSIOLOGY OF THE NERVOUS SYSTEM.

Upon the Character of the Muscular Contractions Which Are Evoked by Excitation of the Various Parts of the Motor Tract. *Jour. of Phys.*, vol. vii., No. 2.

Profs. VICTOR HORSLEY and SHAEFER have made a series of experiments upon this subject with dogs, cats, rabbits, and monkeys. Their results were as follows:

1. The rhythm of muscular response to electrical excitation of the nerve-centres is the same whether the excitation be applied to the gray matter of the cerebral cortex in the motor region, or to the fibres of the corona radiata emanating from that region, or to the spinal cord (but not to the peripheral motor nerves). 2. The rhythm of muscular response in the case of voluntary and reflex contractions is essentially the same as that which results from electrical excitation of the nerve-centres. 3. The rhythm of muscular responses in all cases of after-excitation (whether distinctly epileptoid in their nature or not) is fundamentally the same as that of voluntary and reflex contractions and of contractions immediately produced by a rapidly recurring electrical excitation, but the response in the case of epilepsy may present a secondary rhythmic summation which produces a clonus of a slower rate. The principal conclusion from their results, which have been supplemented by numerous observations on voluntary and epileptoid contractions in man, seems to be this: That every prolonged contraction of the skeletal muscles which is provoked by excitation, whether natural or not, of any part of the nerve-centre, is a tetanic contraction which has been produced by a series of impulses generated in the nerve-centres and passing along the motor nerves at an average of about ten per second.

As to the place of the generation of this rhythm, it is certain that in some cases it occurs in the lower nerve-centres—that is, in the motor-nerve cells of the spinal cord, medulla oblongata, pons, and mesencephalon. At least this conclusion appears to follow from the fact that when we excite the motor tract above those centres by a rapidly interrupted electrical stimulation, the excitation manifests itself by a muscular response which has a rhythm

of only ten per second, whereas it is certain that the rapid excitation of the nerve fibres of the motor tract must have caused equally frequent nervous impulses to pass along those fibres. It is clear, therefore, that these rapidly succeeding impulses have not been transmitted unaltered through the motor-nerve cells, but have become summated within them and converted into a smaller number of impulses, which are then forwarded with a constant slower rhythm by the peripheral motor-nerve fibres to the muscles.

The Rhythm of Muscular Responses to Volitional Impulses in Man. *Jour. of Phys.*, vol. vii., No. 2.

Prof. SCHÄFER and Students CANNEY and TUNSTALL have investigated this subject. They usually employed the opponens pollicis. Their results were as follows :

1. A prolonged voluntary contraction in man is an incomplete tetanus produced by from eight to thirteen successive nervous impulses per second. About ten per second may be taken as the average.

2. The average rate of muscular response to volitional impulses is approximately the same in man as in other mammals that have been examined.

3. The average rate of muscular response to volitional impulses in man is approximately the same as the average rate of muscular response to rapidly recurring excitation of the nerve-centres in animals.

4. The average rate of muscular response to volitional stimuli in man is approximately the same as that obtained in man and animals as the results of pathological or other excitation of the cortex cerebri producing epilepsy, although in the latter case the impulses tend to undergo summation and thus to cause the appearance of clonic contractions of slower rhythm.

5. The rate of muscular response to volitional stimuli in man is nearly the same as the rate of muscular response which is due to activity of the spinal cord alone.

Olfaction. *Du Bois' Archiv*, 1886, Heft 394.

Herr ARONSOHN has made a long series of experiments upon this subject in man. He found that the olfactory nerve was completely blunted for a time through the uninterrupted action of an adequate irritation in the course of a few minutes.

2. Completely exhausted olfactory nerves need at least a minute for complete recovery.

3. Different kinds of smells affect different territories of the olfactory region ; one territory is excited to a maximum degree, a second territory in a lower degree, and a third territory not at all.

The Electrical Discharge of the Malapterurus Electricus. *Jour. of Phys.*, vol. vii., No. 2.

Mr. GOTCH has experimented with a fish brought from the river

Senegal, and he found that the discharge on electrical excitation of the skin is not of a reflex character, but is the result of direct excitation of the electrical organ at the point excited.

2. That the latency of the organ under these conditions is extremely short.

3. That the excitatory state is propagated through the organ at a rate of about two and a half metres per second.

ISAAC OTT, M.D.

The Cerebro-Spinal Paths of Centrifugal Conduction.

Lo Sperimentale, Marzo, 1886.

Experiments upon dogs have been made at the Physiological Laboratory of the Royal Institute at Florence by Drs. IRO NORI and DARIO BALDI, with a view of settling the direction taken by impulses travelling outward from cerebral centres. They give an interesting review of the work already done by Franck and Pitres and others, and a detailed account of their own experimentation, of which the following is a *résumé:*

1. After an excitation of the motor zone of the cortex, if the stimulus be very slight, there follows always a crossed unilateral movement; if the stimulus be stronger, there follows a bilateral movement which may be diffused to all four of the extremities.

2. When a bilateral movement occurs, the first to contract are the muscles of the part or parts opposite, and then the muscles of the part or parts of the same side as the excitation.

3. When spinal hemisection has been performed, the phenomena become inverted, so that the cortical excitation of the opposite side to the hemisection gives a movement more pronounced in the muscles of the same side as the hemispheric excitation, which then is diffused to the muscles of the opposite side corresponding to the hemisection.

4. In a dog in which one of the sigmoid gyri has been extirpated, when the other is excited the movements in the opposite side to the extirpated gyrus are much weaker than those on the same side as the excitation. Then if spinal hemisection is performed at a point corresponding to the last dorsal vertebra on the same side as the ablation of the cortex, and then the motor zone remaining be excited, they lessen, but not entirely, the movements on the same side as that to which the excitation is applied.

5. In a dog with the corpus callosum excised, bilateral movements are possible; those of the same side as the excitation are scarcely appreciable. Hemisection of the cord in this case, by almost complete abolition of the movements resulting in the two extremities of the same side where the excitation is made.

6. In a dog in which there has been a division of the posterior roots on one side which go to make the crural and sciatic nerves, the forms of movements in the two posterior extremities are different if the excitation is applied to the side corresponding to the divided roots.

From these facts they conclude that in the centrifugal transmission of excitations from the motor centres of the cortex of the cerebral hemisphere of a dog, there exists not only transverse interspinal paths of conduction, but also transverse intercerebral paths of conduction. GRACE PECKHAM.

PATHOLOGY (INCLUDING PATHOLOGICAL ANATOMY) OF NERVOUS SYSTEM.

Senile Changes in the Brain. KOSTJURIN. *Wiener Med., Jahrb.* 1886, Heft 2.

Kostjurin has examined a number of brains of old persons in order to determine the histological changes which present themselves in the various tissues in simple senile atrophy. He finds that the greater number of nerve cells in the cortex undergo a more or less marked degeneration with the production of pigment, and fat, and occasionally with the development of vacuoles. In the pericellular space numerous round cells are found in addition to the mass of detritus when the cell is entirely degenerated. The nerve fibres in the cortex are atrophied or reduced in number. The vessels of the cortex undergo an atheromatous degeneration, with the constant production of a connective tissue thickening in their walls. This may become so great as to obstruct the lumen of the vessels. The pigment deposit in the adventitia of the walls is also increased. In the place of the nerve-cells and fibres which have disappeared by atrophy there is found a slight increase in the neuroglia. On the surface of the cortex a large number of corpora-amylacea are found which may form a continuous layer covering the convolutions.

The intensity of these dangers depends less upon the age of the patient than upon the relative degree of loss of weight in the brain, so that they are more evident in light brains than in very old brains. They are sufficient to account for the mental symptoms of senility observed.

The Gulstonian Lectures on Spasm in Chronic Nerve-Disease. By S. J. SHARKEY. *British Medical Journal*, 1886, March and April.

By Spasm is meant excessive muscular contraction in defiance of the will or in excess of the intention. It may be persistent, the individual waves of contraction overtaking each other; intermittent, the individual waves succeeding each other with or without regularity; or co-ordinated, in which case groups of muscles are the seat of clonic spasms which are co-ordinated in such a manner as to produce some regularly recurring though involuntary movement. The motor mechanism through which all movement is produced consists of a cerebral part, viz.: the motor area of the cortex, and the pyramidal tract; and a spinal part, viz.: the an-